Rijkswaterstaat
Ministry of Infrastructure and Water Management

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A Proposal to design a baseline study to evaluate biofouling on commercial vessels.

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Road map

- Background
- Proposed time line for baseline protocol development
- Description of Planned project area(s)
- Inventary of relevant issues/parameters
- Potential Stakeholders and Tools
- Summary outcome of the findings in the present study
- General remarks and contributions from participants

Background

OSPAR EIHA (2018) and HELCOM MARITIME (18-2018) recognized:

- the application of the IMO biofouling guidelines in the North Sea and the Baltic Sea regions.
- minimizing the transfer of invasive aquatic species through ship's biofouling

The Joint Task group HELCOM/OSPAR is mandated (ToR 2020-2024) to :

- oversee Joint Harmonized Procedure implementation for ships exemptions in accordance with Regulation A-4 1.4 BWMC
- to consider the ships' and recreational crafts' biofouling issues at regional level

Background

JTG HELCOM/OSPAR Workshop Rotterdam (2019) recommended:

1. a common regional approach to evaluate IMO biofouling guidelines

2. a common management strategy to support the IMO guidelines and guidance

3. a common (HELCOM/OSPAR) biofouling research and training to collect and share relevant data and information to support management strategies and new approaches to biofouling issues.

   a) issues described in the revised (2019) Baltic Sea Action Plan (BSAP)

   b) the need to develop an evidence base to support the adoption of coordinated NIS management approaches under the forthcoming (2021) OSPAR North East Atlantic Environment Strategy (NEAES).

Proposed time line for Baseline protocol development

2023

An optimised interregional protocol to assess biofouling and NIS introductions through commercial ships

2022

National level Pilot studies to test the design and the applicability of the proposed methodology for baseline Study-leading to the assesment of the levels of biofouling and the introduction of non-indigenous species

2021

Pilot study focused on Rotterdam Port to fully develop and test the value and applicability of the proposed methodologies for inclusion in the baseline study design

2020

Planning and doing an inventory of the tools and knowledge available to aid the development of a research methodology for a baseline assesment of biofouling related NIS introductions

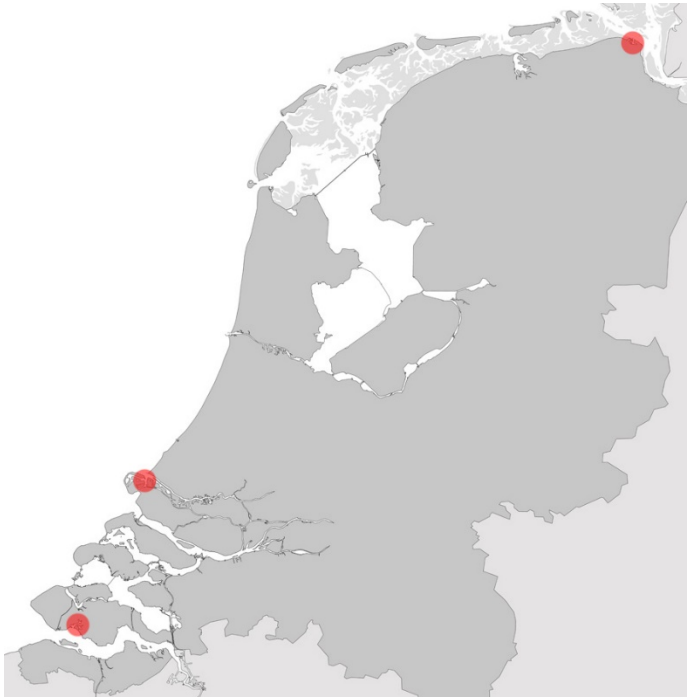
Planned project area

1. Largest capacity in Europe, capable of hosting several types of ships with varying capacities and different levels of biofouling issues.

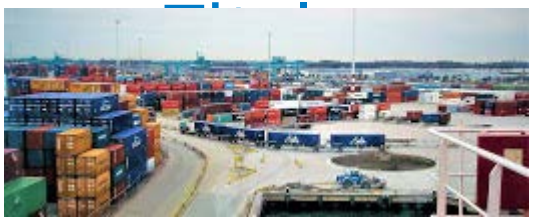
2. Diversity of issues, involvement of Stakeholders after stakeholder analysis, port authorities, ship-owners and shipyard managers
   Active involvement to establish a shared and supportive view for the design and structure of the desired baseline study.

3. Port of Rotterdam has existing data on non-indigenous species through the use of the OSPAR-HELCOM sampling protocol (Gittenberger *et al*., 2014) & the ongoing biofouling monitoring project SETL (Gittenberger *et al*., 2017)

Planned project areas



Groningen
Sea port

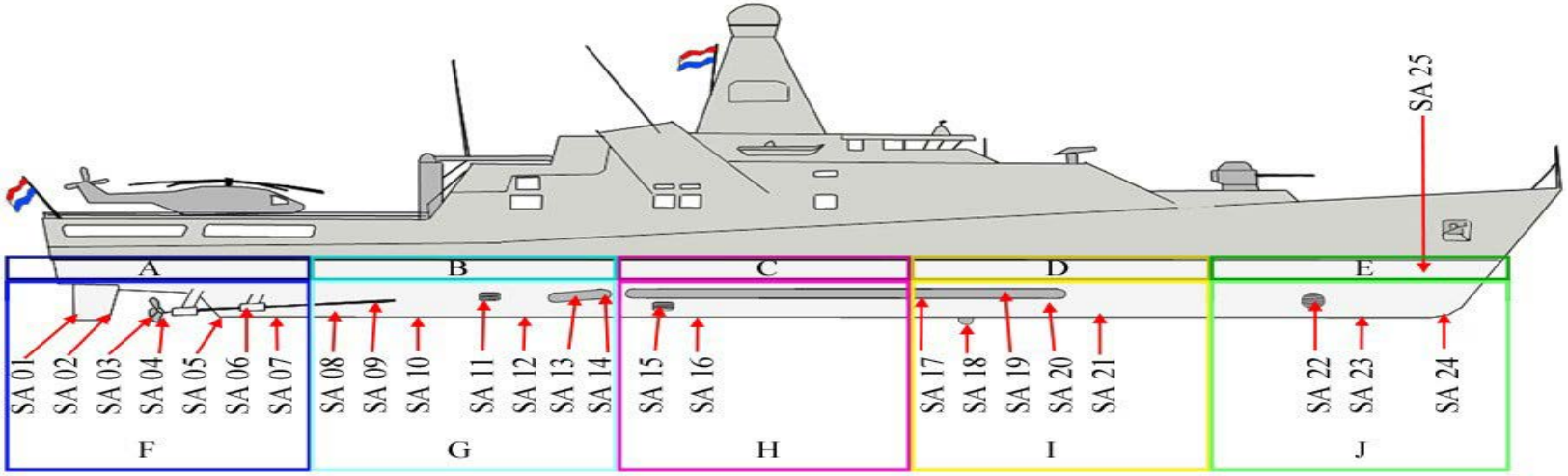


Port of
Rotterdam

Zeeland
Sea port

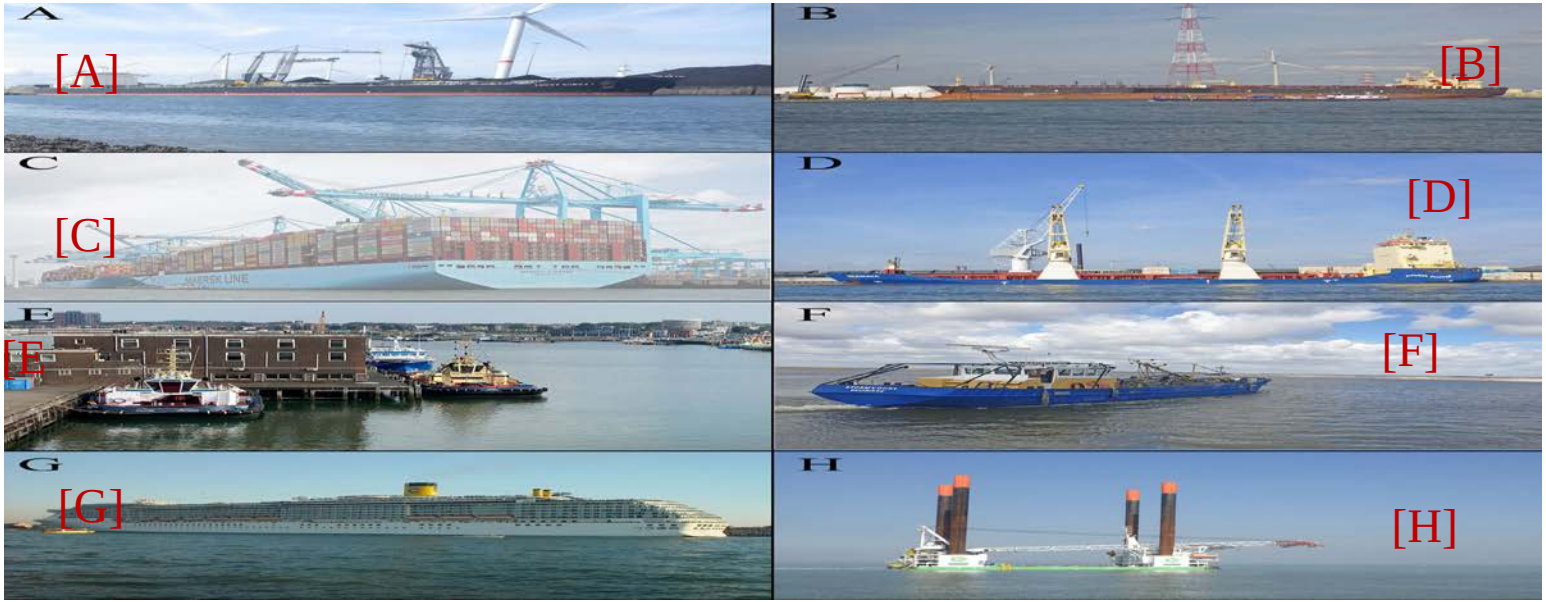
Vessel Types

Schematisch drawing: Vessel huls and niche areas



Gittenberger et al. (2018) when assessing hull-fouling on naval ships of the Netherlands, the hull surface was divided in various zones where different biofouling communities were expected to be recorded. All niche areas were also identified and sampled. Biofouling species diversity differed strongly across niche area. Some niches in general form a higher risk of NIS being present than others. This will be taken into consideration in the Baseline Study Design

Vessel types



Vessel types: [A] Bulker; [B] Tanker; [C] Container ship ; [D] General Cargo;
[E] Tug / supply vessel; [F] Fishing vessel; [G] Passenger ship; [H] Floating platform

Typical Niche areas

[A] Dry Dock strips; [B] Keel; [C] Rudder;
[D] Propellers; [E] Thrusters; [F] Grates

Inventory of relevant issues

Vessel type impact assessment procedure, based on:

- Wetted Surface Area & Niche Area per ship type arriving in a country
- Automatic Identification system (AIS) or similar tracking data system
- Ships potentially aiding the primary introduction of NIS in hul fouling
- Ships potentially aiding the secondary spread of NIS throughout Europe

Vessel selection for Biofouling assessment, based on:

-Vessel type impact assessment

-Shipping behaviour, including the manner in which they travel over the sea

Inventory of relevant areas

[1] The outer hull, not including niche areas

Possible benefits: Easy to access; Fouling may be assessed visually and hull may be scraped from above water.

Possible disadvantages: Lower non-indigenous species diversity on outer hull than in niche areas.

[2] Niche area(s), not distinguishing between niche area types*

*** Different types of niche areas may concern propellers, thruster tunnels, grates, etc. (Fig. 1)**

Possible benefits: Higher non-indigenous species diversity in niches; No knowledge of niche types necessary.

Potential disadvantages: Difficult to access, i.e. only possible in dry dock, with divers or ROVs. Not possible to rank the different types of niche area from low to high risk.

[3] Niche area(s), distinguishing between niche area types

Possible benefits: Higher non-indigenous species diversity is expected in specific niche types; Possibility to rank the risks of different types of niche areas, which could facilitate decisions about eventual management measures in the future. Incentive for developing tools for easier access to these hard to reach niche areas for sampling.

Possible disadvantages: Difficult to access, i.e. only possible in dry dock, with divers or ROVs. Knowledge of niche types necessary.

Inventory of parameters : Biofouling intensity and species community diversity

[1] Level of biofouling intensity

Possible benefits: Easy and quick to assess, using fouling intensity levels as are commonly used in literature.

Possible disadvantages: Biofouling intensity is not necessarily linked to fouling species diversity and thereby the presence of non-indigenous biofouling species.

[2] Diversity of morpho-species/types

Species are not identified, but organisms that look distinctly different in morphology, are separated)

Possible benefits: Gives an indication of species group and/or genus diversity. A higher diversity of fouling species may be used as an indicator of a higher chance of non-indigenous species being present. No knowledge of species is necessary. Material of each morpho-type may be preserved for potential DNA-analyses. This is a hypothesis that will be verified in the pilot.

Possible disadvantages: Indigenous and non-indigenous species are not distinguished. This may lead to an underestimation of the risk of non-indigenous fouling species that may dominate hull fouling communities outcompeting other fouling species. The risk of relatively diverse communities consisting mostly out of indigenous species may be over-estimated.

[3] Diversity of species (communities), indigenous and non-indigenous

Possible benefits: Hard to identify at first, but this may be resolved by a reference database (to be made) with photos (showing diagnostic characters) and DNA-barcodes of hull fouling species recorded in similar EU baseline studies on hull-fouling. Identifying species is the most accurate method to evaluate the role of biofouling on commercial vessels as a vector for non-indigenous species into and across European regional seas.

Possible disadvantages: A need for taxonomic expertise and knowledge about preserving specimens for DNA-analyses and subsequent DNA-sequencing. It will be more costly than for instance assessing the diversity of morpho-species and types only.

Inventory of relevant stakeholders and tools

Stakeholders:

- Port authorities.
- Customs, Inspections authorities (ILT)
- Commercial vessel owners
- Shipyard /dry-dock owners
- Parties conducting scuba-diving and/or ROV activities in ports, involving hull-fouling maintenance-
- Parties doing random checks for drugs (e.g. customs) being smuggled in containers attached to vessel hulls or in niche areas.

Sampling aids and tools to be potentially developed within the pilot

- For each vessel type a reference drawing showing the niche areas should be available
- Tools that may be used to sample niches “difficult to get at” including grates when they are not removed – photographic camera.
- DNA-barcodes & photos of diagnostic characters of all hull fouling species recorded, to be shared openly with all parties that are planning to conduct a similar baseline study.
- Etc.

Summary Outcome of findings

1) Criteria for Prioritising ships for selection
   -ships with bigger niche areas on the outside
   -ships with biggest surface area

2) Focus on ships with more risk for monitoring (methods)

3) Species Identification methods and tools to be used

4) Parameters for monitoring

General remarks and contributions ?

- Prioritising ships- parameters
- Collaborators in the development process
- Use of Niche area/vessel ratios as the scale for biofouling
- Monitoring methodologies/ frequency and reporting times
- Frequency for conducting base line surveys
- Responsible government authorities
- Inspection and reporting procedures

Thank you

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